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## DRAWINGS ATTACHED

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 (72) Inventor BERNHARD KAHL



## (54) A TWO-PART FASTENER

(71) We, A. RAYMOND, a German Company of Teichstrasse 57, 7850, Lorrach/Baden, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a two-part fastener for releasably securing two apertured members together, for instance for fastening a dash-board inside the body work of a motor vehicle.

There are known fastening devices comprising two co-operating parts, one of which is inserted, as a bush, into an aperture in a support with the head portion of the bush wholly or partially overlying the aperture and the other of which is in the form of a retaining pin and is inserted into the bush thereby anchoring the bush in the aperture. The anchoring operation is effected by expanding the wall of the bush and this is achieved by individual cams on the shank portion of the retaining pin which is turned through an angle of 90° in the bush.

At the same time as the bush is anchored in the aperture in the support, the retaining pin is anchored in the bush. Release of the bush and removal of the retaining pin from the bush are effected by removing the expanding stress on the wall of the bush, i.e. by rotating the shank through an angle of 90° relative to the bush. The retaining pin can then be removed from the bush.

A disadvantage of this known two-part fastening device is that, before the connection between the support and the object to be fastened to the support can be made, and two parts must first be individually anchored in the support and the object, and this is a complicated and impractical operation. A further disadvantage is that in practice when this connection is released by removing the retaining pin from the bush, the bush is liable to move out of the aperture in the support which is undesirable. Anchoring of the bush in the aperture in the support by a pressure fit is not sufficient to anchor it

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securely and permanently in the aperture. In this connection it is furthermore disadvantageous if during dismantling the bush is damaged or lost and has to be replaced again before assembly re-commences.

It is an object of the present invention to eliminate or substantially reduce the above described disadvantages of known two-part fasteners.

According to the invention there is provided a two-part fastener for releasably securing two apertured members together, the fastener comprising a stud and a bush, the stud having a head and a shank of non circular cross-section, a neck of circular section adjacent the head and two resilient tongues integral with the shank and extending on opposite sides of the shank rearwardly towards the head, and the bush comprising a base plate having an aperture to receive the shank and neck of the stud so that the stud is rotatable therein relative to the bush and two resilient limbs extending downwardly from the base plate, wherein each limb has a lug projecting outwardly and upwardly towards the base plate and the free end of each limb is inclined inwardly and towards the opposite limb, the dimensions of the stud and bush being such that the tongues on the shank of the stud can be compressed and passed through the aperture in the base plate and thereafter resist withdrawal of the stud therefrom and the stud is rotatable relative to the bush into a position in which the shank expands the limbs of the bush outwardly.

According to a further aspect of the invention there is also provided an assembly of two apertured members releasably secured together with the aid of a fastener as defined above, wherein the bush is permanently attached to one of the members with the limbs extending through the aperture in the one member and with the lugs resisting removal of the bush therefrom and the other member is removably attached to the said one member with the limbs of the bush extending through the aperture in the other

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member and held in frictional engagement against the rim of the aperture in the other member by the shank of the stud which is located between the limbs of the bush and retained therebetween by the tongues which bear against the plate to prevent withdrawal of the stud from the bush.

A preferred form of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is an elevation of a retaining stud,

Figure 2 is a side view of the retaining stud of Figure 1,

Figure 3 is an elevation of an insert bush,

Figure 4 is a plan view of the bush of Figure 3 and,

Figure 5 is an elevation, partly in section, of the assembled retaining stud in the locking position inside the support.

In the drawings a two-part fastener is illustrated which comprises a stud 10 and a bush 11. The stud 10 is preferably formed from a synthetic plastics material as a one-piece moulding and the bush 11 is preferably formed from a single strip of sheet metal and is rendered resilient during manufacture.

The stud 10 has a head 12 which is generally circular and formed with a slot 13 in its upper surface for receiving a screwdriver or similar tool. The head 12 has a generally flat undersurface 14 and a neck 15 of circular cross-section is located adjacent the flat undersurface 14 of the head. A shank 16 of generally rectangular cross-section projects downwardly from the neck portion 15 and includes two resilient tongues 17 and 18 which extend on opposite sides of the shank and rearwardly towards the head. The tongues 17 and 18 are flexibly movable towards and away from the shank 16 and terminate short of the undersurface 14 of the head 12 to provide abutment faces 17a, 18b respectively.

Adjacent the tip of the shank 16 the opposite faces 19, 20 of the shank are tapered inwardly towards the tip.

The bush 11 comprises a generally rectangular base plate 21 having a central rectangular aperture 22, provided with arcuate recesses 23, 24 which are of a diameter to accommodate the neck 14 of the stud. Projecting downwardly from the base plate 21 are two limbs 25, 26, which extend downwardly and outwardly from the base plate and are then bent inwardly and towards one another to form sloping shoulders 27, 28 respectively. Lugs 29 and 30 are sheared and bent outwardly from the upper portions of the limbs 25 and 26 so as to extend rearwardly towards the base plate. Adjacent the free end of the limbs 25 and 26 abutment means in the form of tangs 31 and 32 are

sheared and bent inwardly from the limbs 25 and 26 respectively.

The two-part fastener of the present invention is used to releasably secure together two apertured members in the following manner. The bush 11 is brought up to a panel 33 formed with a rectangular aperture 34 and the two limbs 25, 26 of the bush are passed through the aperture 34. As the limbs pass through the aperture they are forced inwardly slightly until the lugs 27, 28 snap through the aperture and thereafter prevent withdrawal of the bush from the aperture. The base plate 21 which is larger than the aperture 34 in at least one dimension, is then held flat against the upper surface of the panel 33 to prevent the bush from passing through the aperture 34.

The shank 16 of the stud 10 is then aligned with the rectangular aperture 22 in the bush 11 and the shank is passed through the aperture 22 compressing the tongues 17, 18 towards the shank 16. As the neck 15 of the stud 10 enters the aperture 22, the tongues 17, 18 snap through the base plate and thereafter resist withdrawal of the stud from the bush. As the neck 15 is seated in the arcuate recesses 23, 24, the stud 10 can be rotated relative to the bush.

When the stud is trapped within the bush 11, the panel 33 is brought up to a panel 35 which is formed with a rectangular aperture 36 and the limbs 25, 26 of the bush 11 are passed through the aperture 36. As the limbs 25, 26 pass through the aperture 36 they are compressed together slightly and when the panel 33 abuts the panel 35 the stud 10 is rotated through 90° in the bush 11 so that the shank engages the limbs 25, 26 and forces them outwardly from the position shown in chain-dotted lines in Figure 5, into the position shown in full line, thereby bringing the shoulders 27, 28 into frictional engagement with the lower rim of the aperture 36 in the panel 25.

The stud 10 can be rotated in the bush 11 until the shank 16 strikes the tangs 31, 32 on the limbs 25, 26. Thereafter further rotation of the stud is prevented by the tangs 31, 32 and the limbs 25, 26 are held outwardly in frictional engagement with the lower rim of the aperture 36 to resist withdrawal of the bush 11 from the aperture 36.

If, at any time, it is necessary to release the panel 33 from the panel 35, all that is necessary is to rotate the stud 10 back through 90° thereby allowing the limbs 25, 26 of the bush 11 to move inwardly so that the bush can be readily withdrawn from the aperture 36.

It will be seen from Figure 5 that the tapered faces 19, 20 of the shank 16 engage the limbs 25, 26 respectively of the bush and thus the extent to which the limbs 25, 26 are forced outwardly by the rotation of the shank

16 can be varied by varying the inclination on the tapered surfaces 19, 20 or by varying the angle at which the free ends of the limbs 25, 26 are inclined inwardly.

- 5 One substantial advantage of the two-part fastener of the present invention is that the two panels which are fastened together are fastened flush against one another, as can be seen clearly from Figure 5. As the compressive force obtained by the fastener of the present invention can be adjusted readily, in the manner described above, the fastener can be designed to withstand any vibration and to make a secure and permanent connection of the two panels. Locking and unlocking of the fastener can be carried out repeatedly without any signs of fatigue and this can be carried out with the use of a simple tool such as a screwdriver.

20 WHAT WE CLAIM IS:—

1. A two-part fastener for releasably securing two apertured members together, the fastener comprising a stud and a bush, the stud having a head and a shank of non circular cross-section, a neck of circular section adjacent the head and two resilient tongues integral with the shank and extending on opposite sides of the shank rearwardly towards the head, and the bush comprising a base plate having an aperture to receive the shank and neck of the stud so that the stud is rotatable therein relative to the bush and two resilient limbs extending downwardly from the base plate, wherein each limb has a lug projecting outwardly and upwardly towards the base plate and the free end of each limb is inclined inwardly and towards the opposite limb, the dimensions of the stud and bush being such that the tongues on the shank of the stud can be compressed and passed through the aperture in the base plate and thereafter resist withdrawal of the stud therefrom and the stud is rotatable relative to the bush into a position in which the shank expands the limbs of the bush outwardly.

2. A fastener as claimed in claim 1, wherein the limbs of the bush are provided with means for preventing rotation of the stud relative to the bush through more than 180°.

3. A fastener as claimed in claim 2, wherein the said means comprises a tang sheared and bent inwardly from each limb.

4. A fastener as claimed in any preceding claim, wherein the shank of the stud is generally rectangular in cross-section and the aperture in the base plate is of a corresponding shape and provided with arcuate recesses to accommodate the neck of the stud.

5. A fastener as claimed in any preceding claim, wherein the end of the stud is tapered.

6. A fastener as claimed in any preceding claim, wherein the head of the stud is provided with means for facilitating rotation of the stud.

7. A fastener as claimed in any preceding claim, wherein the stud is formed as an integral moulding of synthetic plastics material and the bush is sheared and bent from a single sheet of metal.

8. An assembly of two apertured members releasably secured together with the aid of a fastener as claimed in any preceding claim, wherein the bush is permanently attached to one of the members with the limbs extending through the aperture in the one member and with the lugs resisting removal of the bush therefrom and the other member is removably attached to the said one member with the limbs of the bush extending through the aperture in the other member and held in frictional engagement against the rim of the aperture in the other member by the shank of the stud which is located between the limbs of the bush and retained therebetween by the tongues which bear against the plate to prevent withdrawal of the stud from the bush.

9. A two-part fastener substantially as described herein with reference to the accompanying drawings.

10. An assembly substantially as described herein with reference to the accompanying drawings.

R. G. C. JENKINS & CO.  
Chancery House,  
53—64 Chancery Lane,  
London, W.C.2.  
Agents for the Applicants.

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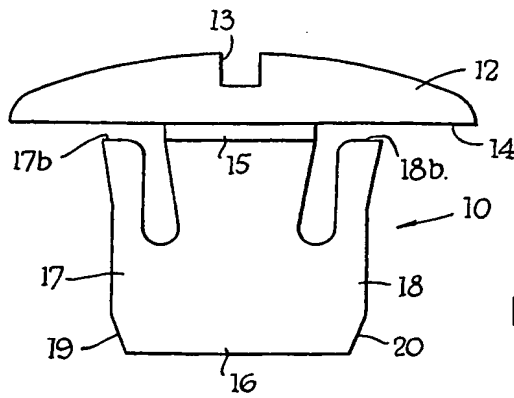


FIG. 1

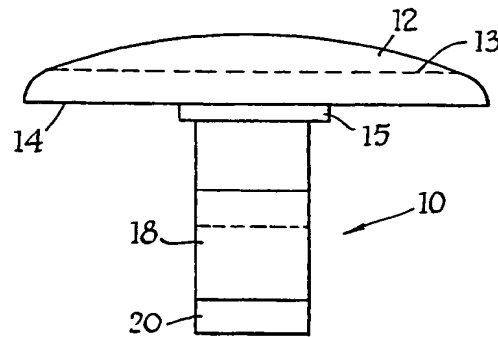


FIG. 2

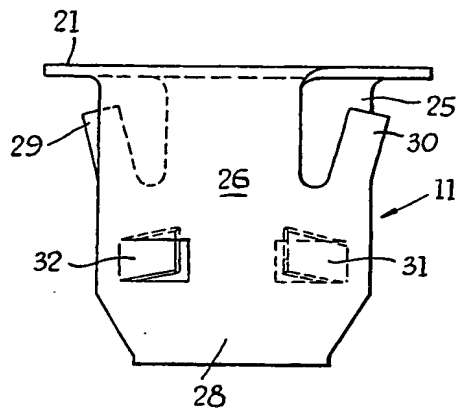


FIG. 3

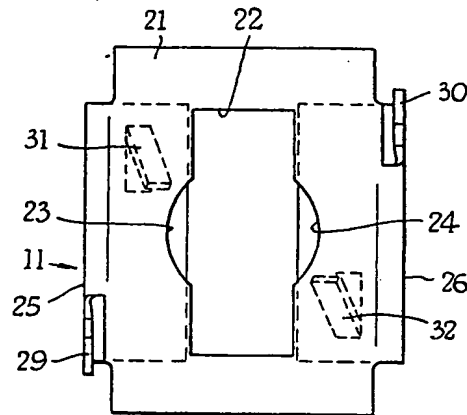


FIG. 4

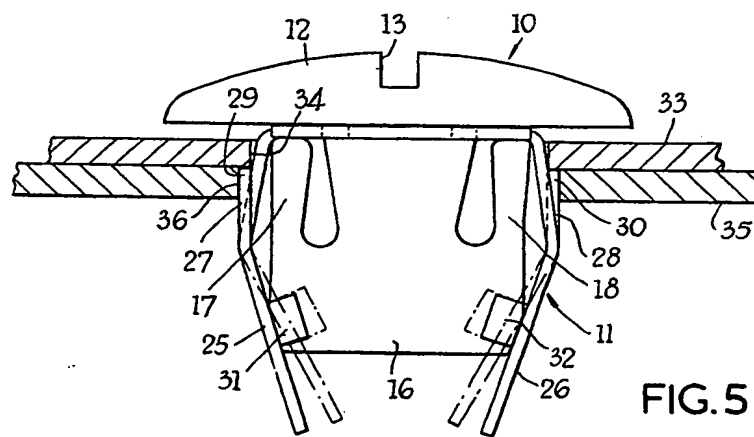


FIG. 5

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